



Axial Rotation Requires Greatest Load in Multifidus Muscle

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General Information

Abstract Title:	Axial Rotation Requires Greatest Load in Multifidus Muscle - Potential Association with Low Back Pain?
Study Design:	Laboratory Investigation (Spine)
Preferred Format:	Oral Abstract
Subject Category:	
Award Consideration:	

Scientific Content

Introduction:	<p>The multifidus muscle is a key stabilizer of the spine[1]. Its atrophy has been shown in patients with low back pain[2] and those with herniations[3], possibly due to overload. Motions and loads that could induce overload are not well understood. The AnyBody Modeling System™ simulation software enables muscle force analysis and contains more than 1000 individual muscle branches, and includes a validated lumbar spine model[4,5] (Fig. 1). The purpose of this study is to examine the force required by the different branches of the multifidus for each of the principal motions.</p>
Methods:	<p>Flexion-extension, lateral bending and axial rotation of the lumbar spine using a model of a standing human under influence of gravity was assessed. The stiffness of each lumbar spinal segment was based on published cadaver measurements. The analyzed parameters were the forces in all branches of the multifidus muscles on the right side of the spine.</p>
Results:	<p>The peak force in a multifidus branch occurred during axial rotation (53N), with lesser forces in flexion/extension (20N) and lateral bending (17N). The multifidus force peaked at the limit of axial rotation (12° of lumbar spine rotation) and diminished towards zero in the opposite direction (Fig. 2), while a maximum force was seen at full flexion with a lesser peak at extension and reduced forces at neutral position.</p>
Conclusions:	<p>Axial rotation motion induced the largest force in the multifidus, which is a key stabilizing muscle of the posterior spine. This result is consistent with previous work showing that axial rotation motion induces the greatest load on the facets[6] and excessive axial rotation motion occurs in patients with low back pain[7]. The current study is limited to an analysis of normal behavior; further study of the multifidus in disease states is warranted.</p>
Learning Objectives:	<p>By the conclusion of this session, participants should be able to understand the importance of the multifidus clinically and the importance of axial rotation motion and its potential association with low back pain.</p>
References:	<p>multifidus, axial rotation, biomechanics, low back pain, herniated disc</p>

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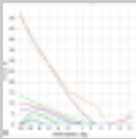
By bringing more attention to the importance of the multifidus in spinal stabilization and in emphasizing the impact of axial rotation to many structures in the spine, including the multifidus, clinicians may be better able to treat their patients.

Attachments:



Title:Fig. 1. Anybody model

Caption:



Title:Fig. 2. Multifidus branch forces during lumbar axial rotation

Caption:

Authors:

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Bruce Robie	ARO Medical, LLC, Primary, Ownership Interest, CEO	X	X	
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